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Diversity Arrays Technology (DArT) And Statistical Tools For Genome Profile-Based Molecular Breeding Of Sugarcane

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Diversity Arrays Technology (DArT) combines the ability to identify various types of DNA polymorphism with the low cost and high throughput platforms DArT offers several-fold gain over other technologies in terms of marker throughput and assay cost and was successfully deployed in over 50 organisms including those with complex, polyploid genomes (www.DiversityArrays.com). We will report the current status of technology development of DArT for sugarcane, one of the most genetically complex crops. Several effective methods of genome complexity reduction were established leading to creation of genotyping array containing 7.680 probes. All markers on the array were sequenced. The analysis of sequence data shows that similarly to other crops sugarcane DArT markers are highly enriched for the genic, low copy number, sequences, enabling effective comparison against sorghum genome assembly. The genotyping array was successfully used for diversity analysis of cultivated materials and ancestral lines as well as for genetic mapping in several populations. The good genome coverage afforded by DArT array enabled efficient discovery of significant marker-trait associations and informed decisions on initiating molecular breeding of sugarcane in Australia. Several challenges identified in the course of technology development and application as well as some novel approaches to dealing with molecular marker and phenotypic data will be presented.